

10/709,042

2

GEMS 0239 PUS

In The Specification:

Please replace Paragraphs 23, 27 and 33 as follows:

[0023] The graded coefficient of thermal expansion material layers 16 coupling the substrate material 12 to the target material 14 are made from a slurry mixture. The graded coefficient of thermal expansion material layers 16, in this embodiment of the present invention, has three layers, i.e., a first layer 17, a second layer 18, and a third layer 19. Although three layers are shown, one or more layers are acceptable. The slurry mixture includes, in any combination, materials including, but not limited to, tungsten, tungsten borides, tungsten carbides, molybdenum, molybdenum borides, molybdenum carbides, zirconium, hafnium, hafnium carbides, binders or other materials taught in the prior art acceptable for use with x-ray anode. The refractory metals and their constituent carbides and borides are typically provided in the slurry mixture as fine particulate powders (typically having a particle size smaller than 50 mm). Carbon fibers are then added to the slurry mixture in sufficient quantities to achieve a desired CTE. Different slurry mixtures are made for each graded layer 17, 18, 19 having different CTEs. The carbon added to the slurry mixture may be chopped carbon fiber, carbon fibers or other materials having the desired CTE increasing or reducing properties. Specifically, the coefficient of thermal expansion of the slurry mixture for each dried layer in the one or more graded coefficient of thermal expansion material layers 16 may be varied by increasing or decreasing the carbon fibers in the mixture, i.e., the key to grading the expansion coefficient is by altering the carbon fibers in the slurry mixture for each of the graded layers.

[0027] Optionally, each of the one or more graded coefficient of thermal expansion material layers 16 may have differing CTEs. For example, the substrate material 12, the target material 14, the first layer 17, the second layer 18, and the third layer 19 may have CTEs of 1, 6, 1.5, 4, and  $5 \times 10^{-6}/^{\circ}\text{C}$ , respectively. The CTE of each layer may differ. Preferably each Each layer of the x-ray anode has may have a CTE that differs by  $2 \times 10^{-6}/^{\circ}\text{C}$ ; and more preferably by an improved CTE differential of  $1 \times 10^{-6}/^{\circ}\text{C}$ . Also, each layer of the x-ray anode may have a CTE that differs by less than  $1 \times 10^{-6}/^{\circ}\text{C}$ .

[0033] Optionally, each of the one or more graded coefficient of thermal expansion material layers 26 may have differing CTEs. For example, the substrate material 22, the target material 24, the first layer 27, and the second layer 28 may have CTEs of 1, 6, 2, and  $5 \times 10^{-6}/^{\circ}\text{C}$ .

10/709,042

3

GEMS 0239 PUS

C, respectively. The CTE of each layer may differ. ~~Preferably each~~ Each layer of the x-ray anode ~~has~~ may have a CTE that differs by  $2 \times 10^{-6}/^{\circ}\text{C}$ ; and ~~more preferably by an improved~~ CTE differential of  $1 \times 10^{-6}/^{\circ}\text{C}$ . Also, each layer of the x-ray anode may have a CTE that differs by less than  $1 \times 10^{-6}/^{\circ}\text{C}$ .